WHAT IS CLAIMED IS:

1. A method comprising:

a) providing functionalized carbon nanotubes, wherein the functionalized carbon nanotubes comprise a functionalized species on the sidewall of the carbon nanotubes selected from the group consisting of (i) aryl halide functionalized carbon nanotubes and (ii) specie comprising a nucleation site operable for anionic or ring opening polymerization;

b) dispersing said aryl halide functionalized carbon nanotubes in a solvent;

c) adding to the solvent at least one of: (i) an alkyllithium species, wherein the alkylthium species reacts with the aryl halide functionalized carbon nanotubes (ii) a metal, wherein the metal reacts with the aryl halide functionalized carbon nanotubes and replaces aryl-halide bonds with aryl-metal bonds, (iii) a deprotonating agent, wherein the deprotonating agent deprotonates the nucleation sites of the functionalized carbon nanotubes and form initiator groups for the anionic or ring opening polymerization;

d) adding a monomer to the solvent; and

e) initiating anionic or ring opening polymerization utilizing the monomer and the functionalized carbon nanotubes to form a polymer-carbon nanotube material.

2. A method comprising:

a) providing aryl halide functionalized carbon nanotubes;

b) dispersing said aryl halide functionalized carbon nanotubes in a solvent;

c) adding an alkyllithium species to the solvent, wherein the alkylthium species reacts with the aryl halide functionalized carbon nanotubes;

d) adding a monomer to the solvent; and

e) initiating anionic or ring opening polymerization utilizing the monomer and the functionalized carbon nanotubes to form a polymer-carbon nanotube material.

3. A method comprising:
   a) providing aryl halide functionalized carbon nanotubes;
   b) dispersing the aryl halide functionalized carbon nanotubes in a solvent;
   c) adding a metal to the solvent, wherein the metal reacts with the aryl halide functionalized carbon nanotubes and replaces aryl-halide bonds with aryl-metal bonds;
   d) adding a monomer to the solvent; and
   e) initiating anionic or ring opening polymerization utilizing the monomer and the functionalized carbon nanotubes to form a polymer-carbon nanotube material.

4. The method of Claim 3, wherein the metal comprises a substance selected from the group consisting of include zinc, nickel, potassium, sodium, lithium, magnesium, cesium, palladium, and combinations thereof.

5. The method of Claim 3, wherein the metal is Mg, which reaction with the aryl-halide functionalized carbon nanotubes comprises formation of a Grignard species.

6. The method of Claims 1-4 or 5, wherein the carbon nanotubes have the aryl halides bonded to the sidewall of the carbon nanotubes.

7. The methods of Claims 1-4 or 5, wherein the aryl halide comprises a halide selected from the group consisting of chlorine, bromine, iodine, and combinations thereof.

8. The methods of Claims 1-4 or 5, wherein the aryl halide is aryl bromide.

9. The methods of Claims 1-4, or 5, wherein the alkyllithium species is n-butyllithium.

10. A method comprising:
   a) providing functionalized carbon nanotubes, wherein the specie functionalized on the carbon nanotubes comprise at least one initiation site operable for anionic or ring opening polymerization;

b) dispersing the functionalized carbon nanotubes in a solvent;
c) adding a deprotonating agent to the solvent, wherein the deprotonating agent deprotonate the nucleation sites of the functionalized carbon nanotubes and form initiator groups for the anionic or ring opening polymerization;
d) adding a monomer to the solvent; and
e) initiating anionic or ring opening polymerization utilizing the monomer and the functionalized carbon nanotubes to form a polymer-carbon nanotube material.

11. The method of Claim 10, wherein the nucleation sites of the functionalized carbon nanotubes are at least one of the elements selected from group consisting of carbon, sulfur, oxygen, and nitrogen.

12. The method of Claim 10, wherein the functionalized carbon nanotubes are selected from the group consisting of phenol functionalized carbon nanotubes, thiophenol functionalized carbon nanotubes, phenethyl alcohol functionalized nanotubes (CNT-C_6H_4-CH_2CH_2OH), CNT-C_6H_4-NHBoc, and combinations thereof.

13. The method of Claims 10-11 or 12, wherein the species functionalized on the carbon nanotubes is functionalized on the sidewall of the carbon nanotubes

14. The method of Claims 10-11 or 12, wherein the deprotonating agent comprises a base.

15. The method of Claim 14, wherein the base is selected from the group consisting of KOH, KH, NaOH, NaH, and potassium hexamethyldisilazide.

16. The method of Claims 10-11 or 12, wherein the deprotonating agent comprises a metal operable for deprotonating the nucleation sites.

17. The method of Claim 16, wherein the metal is selected from the group consisting of zinc, nickel, potassium, sodium, lithium, magnesium, cesium, palladium, and combinations thereof.

18. The methods of Claims 1-5, 10-11, or 12, wherein the initiating anionic or ring opening polymerization step comprises initiating anionic polymerization to form the polymer-carbon nanotube material.

19. The methods of Claims 1-5, 10-11, or 12, wherein the initiating anionic or ring opening polymerization step comprises initiating ring opening polymerization to form the polymer-carbon nanotube material.

20. The methods of Claims 1-5, 10-11 or 12, wherein the functionalized carbon nanotubes are single-wall carbon nanotubes.

21. The methods of Claims 2-5, 10-11 or 12, wherein the solvent is tetrahydrofuran.

22. The methods of Claims 2-5, 10-11 or 12, wherein the monomer is selected from the group consisting of styrene, acrylates, methyl acrylates, vinyl acetate, vinyl pyridines, isoprene, butadiene, chloroprene, acrylonitrile, maleic anhydride, and combinations thereof.

23. The methods of Claims 2-5, 10-11 or 12, wherein the monomer comprises styrene.

24. The methods of Claims 2-5, 10-11 or 12, further comprising adding a suitable terminating agent for terminating the anionic or ring opening polymerization process.

25. The method of Claim 24, wherein the terminating agent is selected from the group consisting of ethanol, acetaldehyde, trimethylsilyl chloride, and combinations thereof.

26. The method of Claim 24, wherein the terminating agent is ethanol.

27. The methods of Claims 1-5, 10-11 or 12, wherein concentration of the monomer is in the range between about 0.03 and about 0. 16 g/ml.

28. The methods of Claims 1-5, 10-11 or 12, wherein the step of initiating anionic polymerization occurs at a temperature in the range between about 0°C and about 50°C.

29. The methods of Claims 1-5, 10-11 or 12, wherein average chain length of the polymer bonded the carbon nanotubes in the polymer-carbon nanotube material is in the range between about 5 and about 1 million,

30. The method of Claim 29, wherein the average chain length is between about 1000 and about 1 million.

31. The methods of Claims 1-5, 10-11 or 12, wherein a catalyst is used during the step of initiating anionic or ring opening polymerization.

32. The method of Claim 31, wherein the catalyst comprises $TiCl_4$.

33. The method of Claims 1-5, 10-11 or 12 further comprising the step of utilizing the polymer-carbon nanotube material in a drug delivery process.

34. The method of Claims 1-5, 10-11 or 12, further comprising the step of utilizing the polymer-carbon nanotube material for scaffolding to promote cellular tissue growth.